P4 PRODUCTION LLC (PWS 6150015)
SOURCE WATER ASSESSMENT
FINAL REPORT

March 14, 2003

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with the well and aquifer characteristics.

This report, *Source Water Assessment for P4 Production LLC, Soda Springs, Idaho*, describes the public water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the public water system (PWS).**

The P4 Production LLC (PWS #6150015) is a non-community, non-transient water system located approximately two miles north of Soda Springs near State Route 34. The water system has one well source (Well #4), and serves approximately 350 persons through a single connection. A portion of the plant is served by the City of Soda Springs PWS. This system can be used as a backup to the plant's PWS if necessary.

Potential contaminant sources identified within the well's delineated capture zones include sites regulated under the Superfund Amendments and Reauthorization Act (SARA), mining facilities, and a Group 1 Site with elevated levels of contaminants. The 1999 Southeastern District Health Department sanitary survey notes a driving area within the immediate vicinity of the well. Additionally, State Route 34 and the railroad are transportation corridors that cross the well's delineation. If an accidental spill occurred from these corridors, IOC (inorganic chemical) contaminants, VOC (volatile organic chemical) contaminants, SOC (synthetic organic chemical) contaminants, or microbial contaminants could be added to the aquifer system. Other contaminant sources identified that may contribute to the overall vulnerability of the water sources were phosphate manufacturers. A complete list of potential contaminant sources is provided with this assessment.

For the assessment, a review of laboratory tests was conducted using the State Drinking Water Information System (SDWIS). Total coliform bacteria have been detected three times in the water system, none of which were found at the wellhead. Since January 1997, subsequent samples have not detected total coliform bacteria in the water. The IOCs fluoride and nitrate have been detected, but at concentrations below the maximum contaminant level (MCL) for each chemical as established by the EPA. Nitrate concentrations found in the well range from 2.9 milligrams per liter (mg/L) to 5.0 mg/L with the peak concentration in June 1995. The MCL for nitrate is 10.0 mg/L. No VOCs or SOCs have ever been detected in the well water.

Final susceptibility scores are derived from equally weighting system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Therefore, a low rating in one or two categories coupled with a higher rating in another category results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a well can get is moderate. Potential contaminants are divided into four categories, IOCs (i.e., nitrates, arsenic), VOCs (i.e., petroleum products), SOCs (i.e., pesticides), and microbial contaminants (i.e., bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant. The capture zones for the well intersects organic priority areas for the IOC nitrate, and the SOC atrazine.

Organic priority areas are described as areas where more than 25 percent of the wells or springs show levels greater than one percent of the primary standard or other health standard. Elevated nitrates may be associated with runoff from fertilizer use; leaching from septic tanks, sewage; or erosion of natural deposits. Atrazine is a widely used herbicide used on row crops, and for controlling broadleaf and grassy weeds.

In terms of total susceptibility, P4 Production LLC Well #4 automatically rated high for IOCs, VOCs, SOCs, and microbials contaminants due to the driving area within the immediate vicinity of the well. System construction rated moderate and hydrologic sensitivity rated high. Potential Contaminant and land use scores were moderate for IOCs VOCs, and SOCs, and low for microbials contaminants.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the P4 Production LLC, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). The well should maintain sanitary standards regarding wellhead protection. Also, any new sources that could be considered potential contaminant sources in the well's zones of contribution should also be investigated and monitored to prevent future contamination. No potential contaminants (i.e., pesticides, paint, fuel, cleaning supplies, etc.) should be stored or applied within 50 feet of the well. Land uses within most of the source water assessment area is outside the direct jurisdiction of P4 Production LLC. The water system may want to consider relocating the driving area near the well to prevent water contamination if an accidental spill occurred in this area. The sanitary survey notes that the well's back up power has a diesel operated pump. Fuel storage for the pump should be located outside the 50-foot sanitary setback and within secondary containment as an additional prevention measure. Therefore partnerships with federal, state and local agencies, industrial and commercial groups should be established to ensure future land uses are protective of ground water quality. Educating employees and the public about source water will further assist the system in its monitoring and protection efforts.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan. There are multiple resources available to help water systems implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture and the Caribou County Soil Conservation District.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (e.g., zoning, permitting) or non-regulatory in nature (e.g., good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR
P4 PRODUCTION LLC, SODA SPRINGS, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this assessment means.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are included. The list of significant potential contaminant source categories and their rankings used to develop the assessment also is included.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the well, and aquifer characteristics. All assessments must be completed by May of 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the public water system (PWS).**

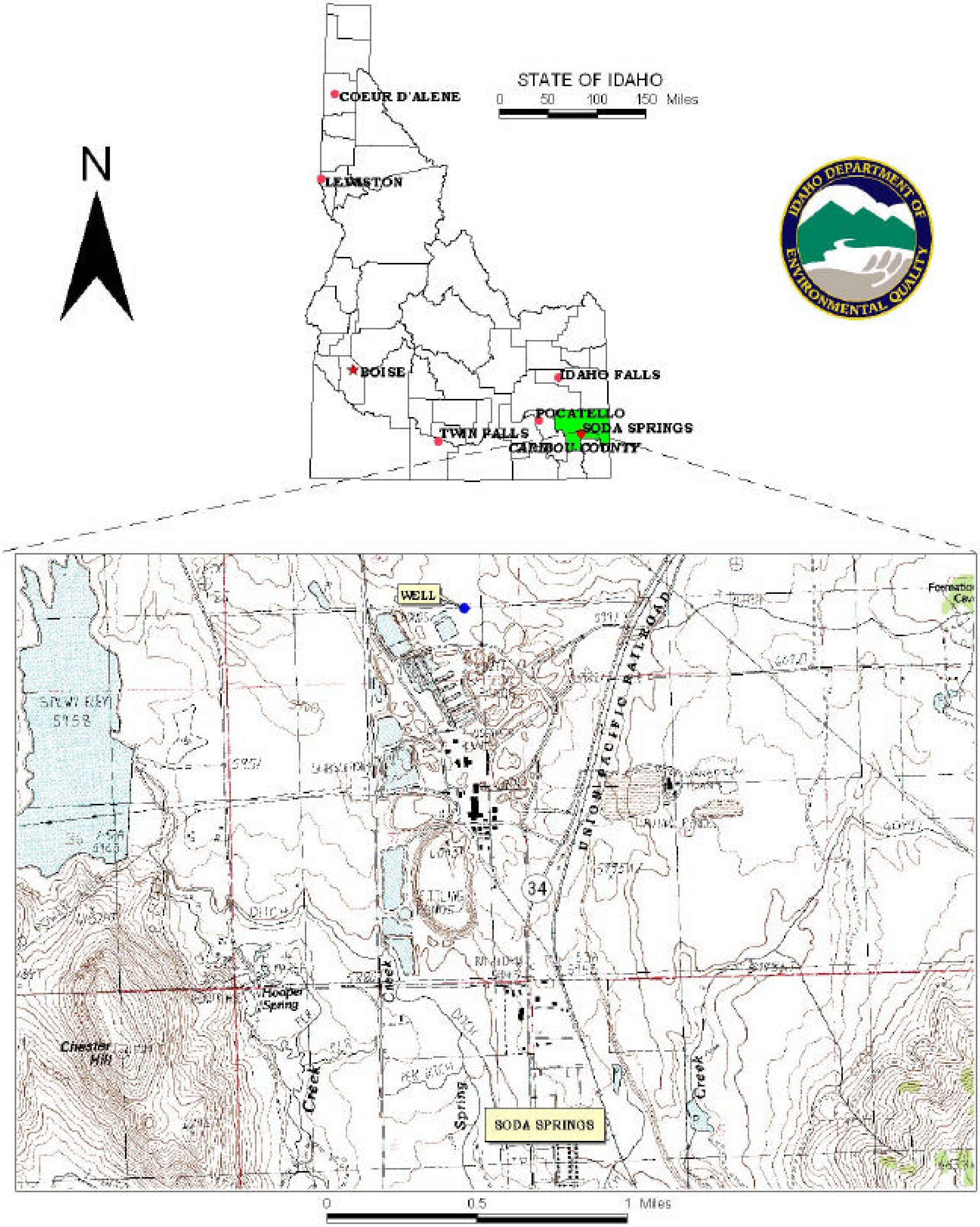
The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. DEQ recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The P4 Production LLC (PWS #6150015) is a non-community, non-transient water system located approximately two miles north of Soda Springs near State Route 34 (see Figure 1). The water system has one well source (Well #4), and serves approximately 350 persons through a single connection. A portion of the plant is served by the City of Soda Springs PWS. This system can be used as a backup to the plant's PWS if necessary.

FIGURE 1. Geographic Location of P4 Production LLC



For the assessment, a review of laboratory tests was conducted using the State Drinking Water Information System (SDWIS). Total coliform bacteria have been detected three times in the water system, none of which were found at the wellhead. Since January 1997, subsequent samples have not detected total coliform bacteria in the water. The IOCs fluoride, and nitrate have been detected, but at concentrations below the maximum contaminant level (MCL) for each chemical as established by the EPA. Nitrate concentrations found in the well range from 2.9 milligrams per liter (mg/L) to 5.0 mg/L with the peak concentration in June 1995. The MCL for nitrate is 10.0 mg/L. No VOCs or SOCs have ever been detected in the well water.

The capture zones for the well intersects organic priority areas for the IOC nitrate, and the SOC atrazine. Organic priority areas are described as areas where more than 25 percent of the wells or springs show levels greater than one percent of the primary standard or other health standard. Elevated nitrates may be associated with runoff from fertilizer use; leaching from septic tanks, sewage; or erosion of natural deposits. Atrazine is a widely used herbicide used on row crops, and for controlling broadleaf and grassy weeds.

Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a pumping well) for water in the aquifer. Washington Group International (WGI) was contracted by DEQ to define the PWS's zones of contribution. WGI used a conceptual computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the Bear River Basin Soda Springs hydrologic province in the vicinity of P4 Production LLC. The computer model used site specific data, assimilated by WGI from a variety of sources including operator records, well logs (when available) and hydrogeologic reports. A summary of the hydrogeologic information from the WGI is provided below.

Bear River Basin Hydrogeologic Conceptual Model

The Bear River originates in the Uinta Mountains of northern Utah and winds its way through over 500 miles of Wyoming, Idaho, and Utah to terminate in a freshwater bay of the Great Salt Lake just 90 miles west of its source (Dion, 1969, p. 6). The Bear River enters Idaho near Border, Wyoming and flows along the north edge of the Bear River Plateau. Flowing north through the Bear River – Dingle Swamp hydrologic province, it passes into the Soda springs hydrologic province east of the Bear River Range. Upon entering the Gem Valley – Gentile Valley hydrologic province, it swings south. Now west of the Bear River Range, the river passes through the Oneida Narrows into the Cache Valley hydrologic province. Over most of its course through Idaho, the Bear River is gaining and in direct hydraulic communication with the major aquifer systems of the four hydrologic provinces. The exception is a small reach between the cities of Alexander and Grace where it is generally losing and is perched over the regional fractured basalt aquifer (Dion, 1969, p. 30).

Ground water in the Bear River Basin is found in Holocene alluvium, Pleistocene basalt, and rocks of the "Pliocene (?)" [sic] Salt Lake Formation, pre-Tertiary undifferentiated bedrock, and possibly the "Eocene (?)" [sic] Wasatch Formation (Dion, 1969, pp. 15 and 16). Rocks of the Salt Lake Formation, which include freshwater limestone, tuffaceous sandstone, rhyolite tuff and poorly-consolidated conglomerate, outcrop along the major valley margins and may underlie the valley-fill alluvium (Dion, 1969, pp. 16 and 17). Many of the wells drilled into this formation do not yield water. The few wells that do produce water yield as much as 1,800 gallon per minute (gpm) from beds of sandstone and conglomerate.

The Wasatch Formation is restricted to the Bear Lake Plateau and small areas northwest of Bear Lake (Dion, 1969, p. 17 and Figure 6). The formation is composed largely of tightly cemented conglomerate and sandstone with smaller amounts of shale, limestone, and tuff. The primary pore space is typically impermeable. Water movement may occur through joints and fractures or more permeable zones that are thought to exist along the relatively flat-lying formation (Dion, 1969, p. 17). Springs occur at the margins of the formation.

Precipitation in the basin ranges from 10 inches per year (in./yr.) on the floor of Bear Lake Valley to over 45 in./yr. on the Bear River Range (Dion, 1969, pp. Vll and 11). Applied over the entire basin, precipitation amounts to approximately 2.3 million acre-feet annually. Precipitation is also the principal source of recharge to the basin's aquifers in conjunction with spring snowmelt and runoff, irrigation seepage, and canal losses.

Natural ground water discharge is by flow to the Bear River, springs, seeps along riverbanks, and evapotranspiration in large marshy areas (Dion, 1969, p. VIII). Some discharge may also occur by way of underflow to the Portneuf River drainage through basalt flows at Tenmile pass and near Soda Point.

Ground water is obtained from both springs and wells in the Bear River Basin. Hundreds of springs issue primarily from fractures and solution openings in the bedrock on the margins of the basin (Dion, 1969, p. 47). Water production from wells in the four hydrologic provinces is primarily from alluvial and basalt aquifers; however, some wells tap conglomerate, sandstone, limestone and shale aquifers of the Salt Lake and possibly the Wasatch formations (Dion, 1969, p. VII).

Soda Springs Hydrologic Province

The Soda Springs hydrologic province occupies approximately 220 square miles north of the Bear River – Dingle Swamp hydrologic province. The Basin and Range physiographic province is generally north to south trending. The mean annual precipitation is 15 to 16 inches, with the majority falling as snow during the winter months (IWRB, 1981, p. 16). Mountains composed of pre-Tertiary formations of carbonate, quartzite, shale, and sandstone bound the province to the northeast and southwest (Dion, 1969, p. 18, and IWRB, 1981, pp. 15-16). The major geologic feature is the Blackfoot Lava Field, which is marked with large northwest trending scarps (Dion, 1974, p.9). The province is marked with extensive faulting surrounding the city of Soda Springs (Dion, 1974, Figure 4).

The valley is filled with Quaternary sediments and tufa and Quaternary and Tertiary basalts (Dion, 1974, Figure 4). Valley-fill sediments are generally thin and produce limited quantities of water. The tufa produces upward of 25 cubic feet per second (ft^3/sec) of water in the form of mineral springs. Basalt flows extending from the Blackfoot Reservoir to south of Soda Springs are the principal aquifer yielding 500 to 3,500 gpm to wells (Dion 1974, p. 9 and Table 1). The total thickness of the basalt ranges from a thin sheet near the flows margin to several hundred feet near the center. The Salt Lake Formation sandstones, limestones, shales and pre-Tertiary undifferentiated bedrock underlie the valley fill and form the surrounding mountains (Dion, 1969, p. 16).

The primary source of ground water recharge is leakage from Blackfoot Reservoir, precipitation, and irrigation. A 3-mile reach of the Blackfoot River directly above the reservoir is also thought to contribute recharge (Dion 1974, p. 12).

Ground water is discharged from the basalt aquifer through springs, evapotranspiration, and underflow to the Bear River and the eastern end of Soda Point Reservoir. Ground water is also discharged by irrigation and domestic wells (Dion, 1974, p. 14).

The ground-water flow direction south of Blackfoot Reservoir is southwest past the city of Soda Springs and then toward the Bear River and Soda Point Reservoir (Dion, 1969, p. 19).

Capture Zone Modeling Approach

An analytic element model was used for the P4 Production LLC Well. The refined method was used based on the available information and the amount of hydrologic uncertainty associated with the basalt aquifer.

WhAEM2000 (Kraemer et al., 2000) was used to delineate capture zones for PWS wells completed or assumed completed in the basalt aquifer associated with the Blackfoot Lava Field. Two constant-head line sinks were used to represent northern and southern water table contours as presented by Dion (1974). The hydraulic heads of the northern and southern line sinks were adjusted as part of the calibration process resulting in final values of 6,098 and 5,967 feet above mean sea level (msl), respectively. A constant-flux line sink backed by a no-flow boundary was placed along the eastern margin of the aquifer to represent recharge along the bedrock/basalt contact. The line sink was assigned a flux value of -1.5 square feet per day (ft^2/day) in the base case model.

The original delineation was developed by WGI, under contract to DEQ and was modified based on DEQ comment. The current revision was initiated based on a request by Monsanto to review information provided by them regarding the hydrogeological conditions associated with this well. This information included the data obtained from pumping tests performed on the P4 well in 1988 and recent MODFLOW modeling of the capture zone of the well. Additional information that was reviewed included ground water monitoring results from the Monsanto CERCLA Phase II Remedial Investigation in 1995 and a ground water evaluation of the area by Dion completed in 1974.

The revised delineation represents a hybrid of that produced by the Monsanto MODFLOW model and the WGI modeling using WHAEM. The primary change in the delineation is a shift to a more northerly direction to include areas to the west of Three Mile Knoll. This reflects the documented, dominant north to south direction of ground water flow in this vicinity. A small component of flow also originates from the eastern side of the knoll, the source being recharge from the Aspen Range. The pump test results and ground water monitoring results both indicate flow to the well from the east.

A large degree of uncertainty exists regarding the length of the TOT zones. This is primarily the result of uncertainty in the hydraulic characteristics such as hydraulic conductivity and porosity of the basalt and cinders that compose the water-bearing zones supplying the production well. Hydraulic conductivity at the well is quite high, greater than 500 feet/day, but may vary considerably at distance from the well. Porosity may also vary greatly, from < 0.1 to 0.3, depending on whether flow occurs in cinders or fractured basalts and on the degree of fracturing of the basalts. The MODFLOW modeling of the regional ground water flow resulted in very long, narrow TOT capture zones with the two or three year zone nearly reaching the Aspen Range recharge front. The revised delineation is less conservative using the shorter capture zone lengths (approximately 2, 4, and 6 miles for the 3, 6, and 10 year TOT zones, respectively) developed in the WGI modeling.

While the older sedimentary rocks of Three Mile Knoll clearly represent a lower conductivity feature than the surrounding basaltic terrain, the degree to which it represents a barrier to regional flow and the degree of recharge which it provides is not well understood. For these reasons it is included in the 3-year TOT capture zone rather than assume that all flow to the well goes around it.

The delineated source water assessment area for the P4 Production LLC well can best be described as a northeast trending lobe approximately two miles wide, approximately four miles in length and extends to the base of Aspen Range (see Figure 2). The actual data used by WGI and DEQ in determining the source water delineation area is available upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act. Furthermore, these sources have a sufficient likelihood of releasing such contaminants into the environment at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Field surveys conducted by DEQ and reviews of available databases identified potential contaminant sources within the delineated area.

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

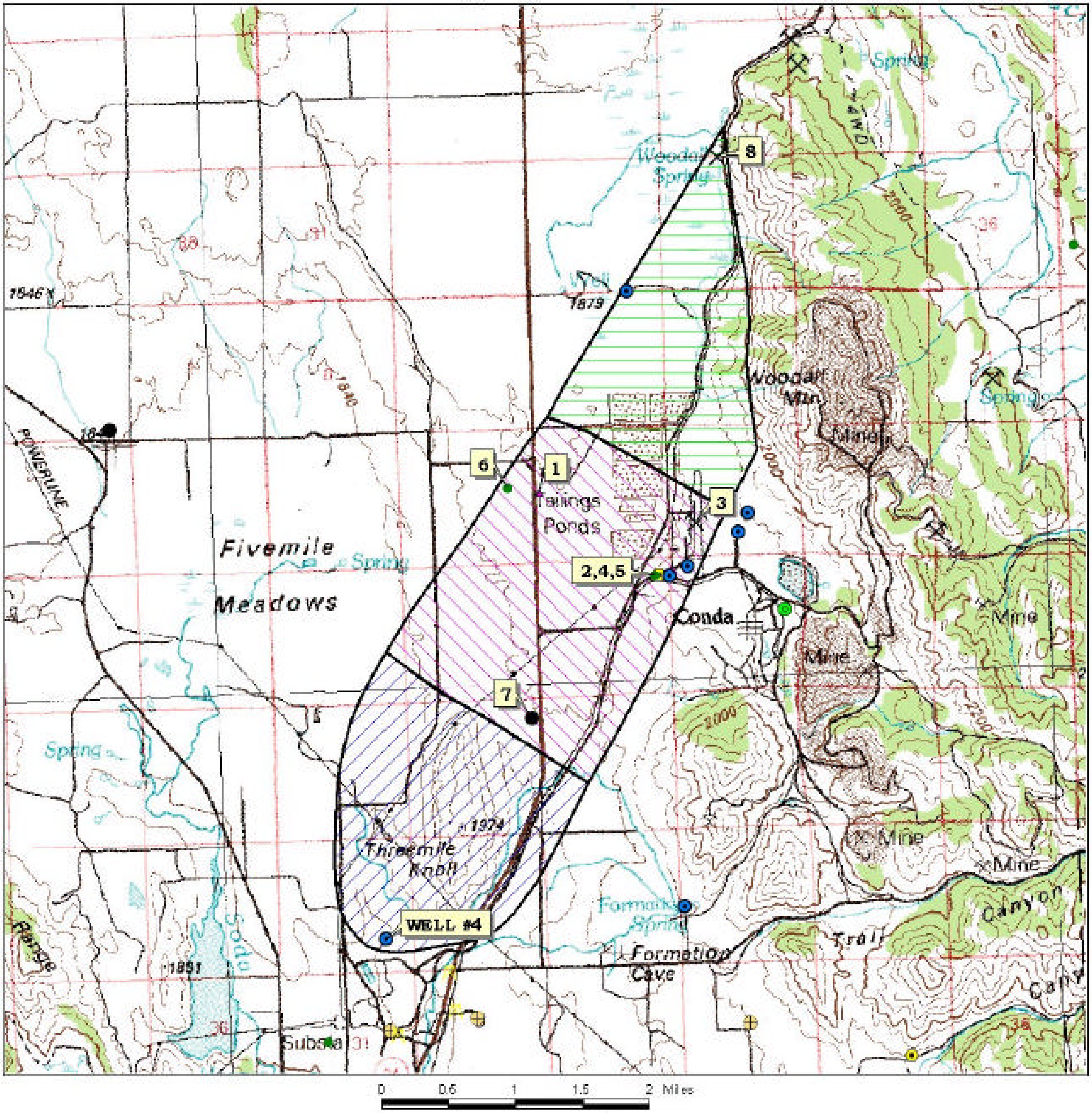
A two-phased contaminant inventory of the study area was conducted in 2002. The first phase involved identifying and documenting potential contaminant sources within the P4 Production LLC source water assessment areas through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the delineated areas. This task was undertaken with the assistance of Ms. Gina Macilwraith, Senior Environmental Engineer for P_4 Production, LLC Soda Springs Plant. At the time of the enhanced inventory, no additional potential contaminant sources were found within the delineated source water area. A map with the well location, delineated areas, and potential contaminant sources is provided with this report (see Figure 2). Potential contaminant source has been given a unique site numbers that references tabular information associated with the PWS well (see Table 1).

Table 1. P4 Production LLC, Potential Contaminant Inventory for Well #4

SITE #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
	Driving area near well	0-3 (Zone 1A)	1999 Sanitary Survey	IOC, VOC, SOC, Microbials
1	UST Site	3-6	Database Inventory	VOC, SOC
2, 4, 5	Phosphatic Fertilizer manufacturer, SARA Site	3-6	Database Inventory	IOC, SOC
3	Mine	3-6	Database Inventory	IOC, VOC, SOC
6	SARA Site	3-6	Database Inventory	IOC, VOC, SOC
7	Group 1 Site	3-6	Database Inventory	IOC
8	Mine	3-6	Database Inventory	IOC, VOC, SOC
	State Route 34	0-3	GIS Map	IOC, VOC, SOC, Microbials
	State Route 34	3-6	GIS Map	IOC, VOC, SOC
	Union Pacific Railroad	0-3	GIS Map	IOC, VOC, SOC, Microbials
	Union Pacific Railroad	3-6; 6-10	GIS Map	IOC, VOC, SOC

[1] SARA =Superfund Amendments and Reauthorization Act, GROUP 1 site = sites with elevated contaminant levels which are outside of priority areas, UST = underground storage tank.
[2] TOT = Number of years for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

FIGURE 2. P4 Production LLC Delineation Map and Potential Contaminant Source Locations



PWS# 6150015
WELL #4

Section 3. Susceptibility Analyses

The susceptibility of the well to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Attachment A contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone (aquitard) above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Hydrologic sensitivity was rated high for the well. This is based upon moderate to well drained soil classes as defined by the National Resource Conservation Service (NRCS). A description of the lithology and well completion was provided by the water system. The lithology from the surface to the static water level (60 feet) is predominantly hard basalt (approximately 30 feet), with minor amounts of silt, sand with basalt, and clayey silt with silty sand. Based upon the well depth (230 feet) and the static water level, the first depth to ground water is less than 300 feet from the surface. Although there are minor amounts of clay above the water producing zone, it does not constitute an aquitard (at least 50 feet of accumulative low permeable material) to help reduce the downward movement of contaminants.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

The system construction score was rated moderate for the well. Well construction information provided by the water system, indicates that the well was drilled in August 1988 to a depth of 230 feet. The well has an unperforated 8-inch diameter casing that extends to depth of the bore hole. According to the 1999 Southeastern Health District sanitary survey, the wellhead and surface seal are adequate. The annular seal extends into hard basalt, whereas the casing extends to a thin clay and sand layer at the base of the hole. The static water level is approximately 60 feet, therefore the highest water production zone for the well is more than 100 feet below the static water level. The wellhead is located outside a 100-year flood plain providing protection from surface water flooding. Protection from surface water flooding is highly dependent on proper well and well house construction.

The Idaho Department of Water Resources (IDWR) *Well Construction Standards Rules (1993)* require all public water systems to follow DEQ standards. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works (1997)* during construction. Under current standards, all PWS wells are required to have a 50-foot buffer around the wellhead and if the well is designed to yield greater than 50 gpm a minimum of a 6-hour pump test is required. These standards are used to rate the system construction for the well by evaluating items such as condition of wellhead and surface seal, whether the casing and annular space is within consolidated material or 18 feet below the surface, the thickness of the casing, etc. If all criteria are not met, the public water source does not meet the IDWR Well Construction Standards. Information relating to the well's construction was provided by the water system. The casing thickness for the well is unknown. For an 8-inch diameter casing, a 0.322-inch casing thickness is recommended to prolong the life of the well. The seal was place to a clay layer at the depth of 60 feet. No pump information was available to assess whether the well met the required standards. Using the available well construction information provided, it was determined that the well did not meet all the criteria outlined in the IDWR Well Construction Standards.

Potential Contaminant Source and Land Use

The potential contaminant sources and land use within the delineated zones of water contribution are assessed to determine the well's susceptibility. When agriculture is the predominant land use in the area, this may increase the likelihood of agricultural wastewater infiltrating the ground water system. Agricultural land is counted as a source of leachable contaminants and points are assigned to this rating based on the percentage of agricultural land. The predominant land use within the delineated capture zones of the P4 Production LLC water system is considered dryland agriculture.

Potential contaminant sources identified within the well's delineated capture zones include sites regulated under the Superfund Amendments and Reauthorization Act (SARA), mining facilities, and a Group 1 Site with elevated levels of contaminants. The 1999 Southeastern District Health Department sanitary survey notes a driving area within the immediate vicinity of the well. Additionally, State Route 34 and the railroad are transportation corridors that cross the well's delineation. If an accidental spill occurred from these corridors, IOC, VOCs, SOCs, or microbial contaminants could be added to the aquifer system. Other contaminant sources identified that may contribute to the overall vulnerability of the water sources were phosphate manufacturers. Refer to Table 1 for a complete list of potential contaminant sources is provided with this assessment.

In terms of potential contaminant sources and land use susceptibility, the ratings are as follows: The well rated moderate for IOCs (i.e., nitrates, arsenic), VOCs (i.e., petroleum products) and SOCs (i.e., pesticides), and low for microbial contaminants (i.e., bacteria). Refer to Table 2 for summary of susceptibility evaluation, and to Figure 2 for well location, delineated TOT zones, and locations of potential contaminant sources.

Final Susceptibility Ranking

A detection above a drinking water standard MCL, or any detection of a VOC or SOC will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. Additionally, potential contaminant sources within 50 feet of a wellhead will automatically lead to a high susceptibility rating. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year TOT zone (Zone 1B) contribute greatly to the overall ranking.

Table 2. Summary of P4 Production LLC Susceptibility Evaluation

Drinking Water Source	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Potential Contaminant Inventory and Land Use				System Construction	**Final Susceptibility Ranking**			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #4	H	M	M	M	L	M	H*	H*	H*	H*

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
H* = Automatically rated highly susceptibility due to driving area within immediate vicinity of well

Susceptibility Summary

The overall susceptibility ranking for P4 Production LLC Well #4 automatically rated high for IOCs, VOCs, SOCs, and microbials contaminants due to the driving area within the immediate vicinity of the well. If the driving area was relocated outside of the 50-foot sanitary setback, the overall susceptibility score would be reduced to moderate in all contaminant categories. The system construction score was rated moderate, and hydrologic sensitivity scores rated high. The potential contaminant inventory and land use scores were moderate for IOCs, VOCs and SOCs, and low for microbial contaminants.

Total coliform bacteria have been detected three times in the water system, none of which were found at the wellhead. Since January 1997, subsequent samples have not detected total coliform bacteria in the water. The IOCs fluoride and nitrate have been detected, but at concentrations below the MCL for each chemical as established by the EPA. No VOCs or SOCs have ever been detected in the well water.

The county level herbicide use is considered high in this area due a significant amount of agricultural land. Although there may only be a small portion of agriculture land in the direct vicinity of the well, it is useful as a tool in determining the overall chemical usage such as pesticides and how they may impact ground water through infiltration and surface water runoff. In addition, potential sources of contamination found within the well's delineated TOT zones (see Figure 2).

Section 4. Options for Drinking Water Protection

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the P4 Production LLC, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey. The well should maintain sanitary standards regarding wellhead protection. Also, any new sources that could be considered potential contaminant sources in the well's zones of contribution should also be investigated and monitored to prevent future contamination. No potential contaminants (i.e., pesticides, paint, fuel, cleaning supplies, etc.) should be stored or applied within 50 feet of the well. Land uses within most of the source water assessment area is outside the direct jurisdiction of P4 Production LLC. The water system may want to consider relocating the driving area near the well to prevent water contamination if an accidental spill occurred in this area. The sanitary survey notes that the well's back-up power has a diesel operated pump. Fuel storage for the pump should be located outside the 50-foot sanitary setback and within secondary containment as an additional prevention measure. Therefore partnerships with federal, state, and local agencies, industrial and commercial groups should be established to ensure future land uses are protective of ground water quality. Educating employees and the public about source water will further assist the system in its monitoring and protection efforts.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan. There are multiple resources available to help water systems implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture and the Caribou County Soil Conservation District.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e., zoning, permitting) or non-regulatory in nature (i.e., good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Pocatello Regional DEQ Office	(208) 236-6160
State DEQ Office	(208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Ms. Melinda Harper at (208) 343-7001 or email her at mlharper@idahoruralwater.com for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25% of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RCRA – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

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Attachment A

P4 Production LLC
Susceptibility Analysis
Worksheet

The Hydrologic Sensitivity and System Construction scores are rated individually:

0 - 1 Low Susceptibility

2 - 4 Moderate Susceptibility

5 - 6 High Susceptibility

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x **0.20**)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x **0.375**)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report   Public Water System Name : P4 PRODUCTION LLC   Well#: WELL #4

Public Water System Number 6150015   2/10/03 4:47:35 PM

1. System Construction

		SCORE
Drill Date	8/12/88	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	1999
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		3

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	NO	0
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	NO	2
Total Hydrologic Score		5

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	DRYLAND AGRICULTURE	1	1	1	1
Farm chemical use high	YES	0	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	YES	YES	YES
Total Potential Contaminant Source/Land Use Score - Zone 1A		1	1	3	1

Potential Contaminant / Land Use - ZONE 1B

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant sources present (Number of Sources)	YES	2	2	2	2
(Score = # Sources X 2) 8 Points Maximum		4	4	4	4
Sources of Class II or III leacheable contaminants or	YES	6	2	2	
4 Points Maximum		4	2	2	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	2	0
Land use Zone 1B	Greater Than 50% Non-Irrigated Agricultural	2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B		12	8	10	6

Potential Contaminant / Land Use - ZONE II

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Non-Irrigated Agricultural	1	1	1	
Potential Contaminant Source / Land Use Score - Zone II		4	4	4	0

Potential Contaminant / Land Use - ZONE III

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		2	2	2	0

	IOC Score	VOC Score	SOC Score	Microbial Score
Cumulative Potential Contaminant / Land Use Score	19	15	19	7
4. Final Susceptibility Source Score	12	11	12	11
5. Final Well Ranking	High	High	High	High